

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE**

HEARING CHARTER

H.R. 3980, The National Windstorm Impact Reduction Act of 2004

Wednesday, March 24, 2004

2:00 - 4:00 PM

**2318 Rayburn House Office Building
Washington, DC**

1. Purpose

On Wednesday, March 24, 2004, at 2:00 p.m., the House Science Committee will hold a hearing to receive testimony on H.R. 3980, the *National Windstorm Impact Reduction Act of 2004*, and to consider the role of federal research and development in windstorm hazard reduction. The hearing will build upon discussions from a February 9, 2004, Science Committee field hearing in Lubbock, Texas, on windstorm hazards.

2. Witnesses

Dr. John Brighton is the Assistant Director for Engineering at the National Science Foundation (NSF). He previously served as Provost of National-Louis University, and before that was Executive Vice President and Provost at Pennsylvania State University.

Mr. Anthony Lowe is the Administrator of the Federal Insurance Mitigation Administration (FIMA), a division of the Emergency Preparedness and Response (EPR, formerly FEMA) Directorate of the Department of Homeland Security. He will be accompanied by **Mr. Edward Laatsch**, Chief of the EPR/FEMA Building Science and Technology Branch.

Dr. Steven L. McCabe is a professor in the Department of Civil, Environmental and Architectural Engineering at the University of Kansas. Dr. McCabe will be testifying on behalf of the American Society of Civil Engineers (ASCE), of which he is a member. He currently holds a temporary position at NSF as Program Director for the Structural Systems and Engineering Programs within the Division of Civil and Mechanical Systems.

Mr. Jeffrey Sciaudone is the Director of Engineering and Technical Services for the Institute for Business & Home Safety (IBHS). Mr. Sciaudone represents IBHS on various technical industry committees concerning natural disaster mitigation and oversees the development of products dealing with the public understanding of natural hazard mitigation. He also serves on the International Code Council's Industry Advisory Committee.

3. Overarching Questions

The hearing will address the following overarching questions:

1. How vulnerable is the built environment in the United States to windstorm hazards? What are some of the top opportunities for, and primary barriers to, reducing these vulnerabilities?
2. What are the size, structure, and focus of ongoing efforts to reduce the impact of windstorms in the United States, particularly with regard to research and development? How can non-federal entities such as the insurance industry and state and local governments contribute to, and benefit from, improved wind hazard mitigation?
3. What gaps in data exist with regard to our knowledge and understanding of windstorm hazards, and how could the overall wind hazard mitigation portfolio be refocused or otherwise strengthened to improve mitigation in the United States?
4. Will the program established by H.R. 3980 result in greater R&D breakthroughs and increased adoption of windstorm impact mitigation measures? How could H.R. 3980 be improved?

4. Brief Overview

- The United States currently sustains several billion dollars each year in property and economic losses due to windstorms. While estimates of annualized windstorm damages are highly variable and limited in scope, the National Weather Service estimates that between 1995 and 2002, hurricanes, tornadoes, and thunderstorm winds caused on average \$4.5 billion in damage per year. The American Society of Civil Engineers has estimated windstorm damages to be in excess of \$5 billion per year.
- The most powerful hurricane in the last century to hit the United States was Hurricane Andrew, in August of 1992. It caused 58 deaths and approximately \$27 billion in damages. In addition, more than one million people were evacuated from Southern Florida because of the storm.
- A variety of cost-effective windstorm hazard mitigation measures exist, and many more are undergoing research and development. It is unclear to what extent these mitigation technologies have been adopted, but it is generally agreed that they have been under-utilized, and that significant improvements in the wind resistance of buildings and other structures will not be achieved without improved incentives at the local and individual level. This fact, combined with growing populations in coastal areas particularly susceptible to major windstorms, has led to substantial increases in the overall windstorm vulnerabilities.

- Federal windstorm hazard mitigation efforts span several agencies, including the Federal Emergency Management Agency (FEMA), National Institute of Standards and Technology (NIST), National Oceanographic and Atmospheric Administration (NOAA), and National Science Foundation (NSF). Evaluations of the size, scope, and effectiveness of these mitigation efforts have found significant room for improvement. For example, a 1999 report by the National Academy of Sciences found that: "...there is still a lack of leadership, focus, and coordination of wind-hazard mitigation activities across all agencies, and funding for research and development specifically targeting wind-hazard reduction issues is insufficient."
- On March 16, 2004, Representatives Neugebauer and Moore introduced H.R. 3980, the *National Windstorm Impact Reduction Act of 2004*. The bill authorizes a national wind hazard impact reduction program and a multi-agency working group to carry out activities that will improve understanding of windstorm impacts on structures and help develop and encourage implementation of mitigation measures to reduce those impacts.

5. Background

Hurricanes and Tornadoes

High winds can easily destroy poorly constructed buildings and mobile homes. Hurricanes can reach constant wind speeds greater than 155 mph and extend outward as far as 400 miles. While the National Weather Service is able to detect hurricanes days before they make landfall, predicting when, where, and with what force a hurricane will hit remains an inexact science.

Tornadoes generally occur near the trailing edge of a thunderstorm, though they are also often produced by hurricanes. Tornado winds can reach up to 300 mph and can be powerful enough to lift homes off foundations. Tornadoes are much more difficult to detect than hurricanes with an average lead-time for warnings of only 12 minutes. This makes evacuation nearly impossible, a factor that led to the development and implementation of in-residence tornado shelters.

Since 1950, tornadoes have claimed over 4,400 lives. On average, nearly 800 tornados occur each year in the United States- primarily in the South and Midwest, though they have been documented in all 50 states. During a 16-hour period that began on April 3, 1974, 148 tornadoes occurred in states from Michigan to Mississippi, killing 315 people and resulting in 6,142 injuries. This event is generally considered to be one of the most prolific tornado outbreaks of the 20th century.

While the federal government does not maintain a comprehensive windstorm loss database, the National Weather Service does compile damage estimates that demonstrate the tremendous costs of windstorms (table 1). Also, the insurance industry maintains separate loss databases that measure damage to insured property. However, according to

“Disasters by Design: A Reassessment of Natural Hazards in the United States,” a 1999 report by the National Academy of Sciences, insurance industry data may represent only a small percentage of total losses because many property owners do not buy coverage against hurricanes and other natural hazards.

Table 1. National Weather Service Estimates of Windstorm Impacts (1995-2002)

Year	Fatalities			Injuries			Total Damages (In millions of \$)		
	Tornados	Hurricanes	T-storm Winds	Tornados	Hurricanes	T-storm Winds	Tornados	Hurricanes	T-Storm Winds
2002	55	51	17	968	346	287	802.1	1382.4	344.5
2001	40	24	17	743	7	341	637.5	5190.5	378.8
2000	41	0	25	882	1	296	430.5	8.2	304
1999	94	19	29	1842	10	325	1998.2	5068.8	388.7
1998	130	9	41	1868	77	860	1736.2	4127.9	1597.3
1997	67	1	37	1033	32	425	736.5	875.4	242.1
1996	25	37	23	705	22	335	732.1	1787	452.8
1995	30	17	38	650	112	473	410.8	5932.3	745.1

With more people than ever before living near coastlines, vulnerability to wind hazards in the U.S. is steadily increasing. Already, more than one in six Americans live in a county that lies on the Atlantic or Gulf of Mexico coast. In addition, the coastal population is growing rapidly, particularly from Texas through the Carolinas. In popular resort areas that are common along the coastline, numbers often swell even further when holiday, weekend, and vacation visitors arrive. These large and growing populations have resulted in substantial increases in buildings and infrastructure in high-risk coastal areas that are also vulnerable to windstorms.

Federal Windstorm Hazard Mitigation Efforts

The bulk of current windstorm hazard funding is directed toward fundamental research and development into the atmospheric and meteorological aspects of windstorms, contributing to a greater understanding of weather-related phenomena, but generally without specific mitigation applications in mind. A smaller portion of the windstorm hazard research and development effort is directed toward structural and engineering aspects of buildings and infrastructure impacted by windstorms. In a 2003 report, the RAND Corporation, in a study conducted for the Office of Science and Technology Policy, recommended that R&D distribution be reoriented toward longer-term loss reduction efforts: “This is especially relevant for weather-related hazards, for which R&D is primarily limited to procurements for short-term forecasting efforts. ...the present emphasis on short time scales is clearly circumventing more-lasting solutions. In practice, much of climate change R&D is focused on short-term forecasts, which do not result in significant loss reduction. A shift to longer-term and less prediction-oriented efforts, with a focus on investigations and technologies to make the built environment and infrastructures more resilient, holds great promise. Such R&D promises to save lives, protect property, and dramatically reduce the costs of rebuilding after a disaster.”

The size and scope of federal investments in R&D focused on reducing structural vulnerability to windstorm impacts is generally agreed to be in the range of a few million dollars, though specific numbers are not readily available, in part because of the fragmented and uncoordinated nature of these efforts. In a 1999 report, the National Academy of Sciences recommended, “The federal government should coordinate existing federal activities and develop, in conjunction with state and local governments, private industry, the research community, and other interested stakeholder groups, a national wind-hazard reduction program. Congress should consider designating sufficient funds to establish and support a national program of this nature.”

Non-R&D Related Barriers to Greater Implementation of Mitigation Techniques

Unfortunately, simply developing technical solutions will not reduce vulnerability to wind hazards. FEMA and the insurance industry have both determined that improving the wind resistance of buildings will only be achieved when there is a demand for wind-resistant construction by homeowners. Solving the windstorm vulnerability problem will not only require coordinated work in scientific research and technology development, but education, public policy, the behavioral sciences, and technology transfer as well.

The immense amount of damage that windstorms cause each year and the existence of proven building and construction techniques for limiting that damage, have led only to very limited implementation of mitigation measures. Perhaps the best explanation for this is psychological - most people just assume that they won't be affected by natural hazards and aren't willing to invest even minimal time and resources into reducing the vulnerability of their own homes. Among the barriers to effective mitigation are:

- **Lack of useful loss data:** Windstorm loss data collection is not sufficiently detailed or comprehensive. The federal government has no uniform procedure for compiling loss data, including data on the economic effects of windstorms. The insurance industry does have mechanisms in place for more detailed data collection but the value of this data is unclear, largely because it is proprietary. In addition, the data only covers insured losses, a small portion of overall windstorm losses. Without access to accurate, meaningful data, it is difficult to measure the effectiveness of mitigation techniques or establish public policy priorities.
- **Lack of understanding:** Many homeowners are simply unaware of the dangers presented by windstorms, and even more are unaware that techniques exist for reducing structural vulnerability to these dangers. This is also a problem in the building and construction industry and among policy makers, although to a lesser degree.
- **High cost of implementation:** Existing mitigation techniques are effective, but often expensive. For example, a City of Lubbock housing program builds houses for low-income residents that are designed to withstand winds up to 150 miles per hour and have a safe room to provide additional protection. Of the \$78,000 that it costs to build one of these houses, \$8,500 goes towards windstorm mitigation. The City of Lubbock no longer offers residents the option of choosing

conventionally built homes, but in the private sector where market forces dictate choices, most are still unwilling to pay.

- **Limited financial incentives:** Exacerbating the problem of high cost is the lack of financial incentives for homeowners who are willing to make the extra investment. In general, neither the insurance industry nor local, state, or federal governments have been willing to provide financial inducements in the form of rate or tax breaks for homeowners who take steps to reduce vulnerability.
- **Building codes:** For the most part, building codes and local enforcement practices do not address the problem of windstorm vulnerability. Local and state officials are generally either unaware of the dangers and potential mitigation solutions, or are unwilling to enact and enforce strict codes that might be expensive for their constituents.

6. H.R. 3980 Summary

H.R. 3980 establishes the National Windstorm Impact Reduction Program, and directs the Director of the Office of Science and Technology Policy to establish an Interagency Working Group of NSF, NOAA, NIST, and FEMA. The working group will be responsible for planning, management, and coordination of the program. This structure is similar to the National Earthquake Hazard Reduction Program (NEHRP). NEHRP, a long-term, comprehensive, multi-agency earthquake hazards reduction program, was established by Congress in 1977 to minimize the loss of life and property from earthquakes.

Drawing from recommendations provided by the American Association of Wind Engineers at the February 9th Science Committee hearing in Lubbock, Texas, H.R. 3980 focuses on improving understanding of windstorm impacts, and developing and encouraging implementation of mitigation measures to reduce those impacts. The legislation has been endorsed by the Wind Hazard Reduction Coalition, which includes the American Society for Civil Engineers (ASCE), National Fire Protection Association (NFPA), American Association for Wind Engineering (AAWE), International Code Council (ICC), and Manufactured Housing Institute (MHI). A section-by-section overview of H.R. 3980 is provided in Appendix I.

7. Questions for Witnesses

The witnesses were asked to address the following questions in their testimony:

Dr. Brighton

- Please describe NSF's current support for windstorm impact reduction-related research, including estimated funding in both engineering and the atmospheric sciences?
- What is the status of understanding and knowledge of windstorms and their impacts on buildings and infrastructure? What areas of research have the most potential for

contributing to developments that will reduce windstorm impacts? How does NSF work to determine funding priorities in these areas.

- To what extent does NSF currently work with other Federal agencies in addressing the impacts of windstorms?

Mr. Lowe

- Please describe FEMA's current activities in windstorm impact reduction, including collaborative efforts with public and private entities. How much support does FEMA provide for activities such as data collection and analysis, outreach, and information dissemination? What are some of the top opportunities for, and barriers to, addressing windstorm vulnerabilities, and how is this information used in determining priorities in various mitigation areas.
- What is the status of HAZUS-MH and how will it assist communities, states, and regions in reducing vulnerability to hurricanes once it is fully operational? What plans does FEMA have for developing a HAZUS version that will allow for modeling tornados and other types of windstorms?
- To what extent does FEMA currently work with other Federal agencies, universities, and the insurance industry in addressing the impacts of windstorms?

Dr. McCabe

- How would you characterize the size and focus of ongoing wind hazard mitigation research and development being performed by the insurance industry? To what extent do insurance industry research efforts build on research done by universities or the government, and vice-versa? How does the insurance industry work with federal, state, and local governments to share data that may help contribute to windstorm hazards reductions?
- Approximately how much damage do wind hazards cause in the United States on an annual basis, and are these damages broken down by variables such as building types, structural characteristics, and geography? What types of damage are taken into account in compiling these damage estimates, and what types are not included? What data gaps exist with regard to our knowledge and understanding windstorm hazards?
- What role does the insurance industry play in encouraging implementation of existing mitigation techniques in retrofitting and new home construction? To what extent do insurance policies consider and incorporate incentives for implementation of these mitigation techniques?

Mr. Sciaudone

- Please Describe IBHS' current activities in addressing windstorm impacts, including R&D. How much emphasis is placed on basic research versus applied R&D? To what extent do IBHS R&D efforts build upon research supported by universities and federal agencies? To what extent does IBHS collaborate with universities and federal agencies in its R&D efforts? How does IBHS work with federal, state, and local governments to share data that may help contribute to windstorm impact reductions?
- Please describe the insurance industry's windstorm impact data collection and analysis activities. How is this information used to help insurance companies estimate vulnerability? How could the federal government gain access to insurance industry data without damaging the proprietary value of that information?
- What are the greatest obstacles to increased implementation of windstorm mitigation techniques in new and existing structures? To what extent do insurance policies consider and incorporate incentives for implementation of these mitigation techniques?

Appendix I

Section by Section Analysis of H.R. 3980

National Windstorm Impact Reduction Program (NWIRP) Act of 2004

Sec. 1. Short Title.

“National Windstorm Impact Reduction Act of 2004”

Sec. 2. Findings.

The Congress finds that:

- (1) All states and regions are vulnerable to windstorms.
- (2) The United States sustains several billion dollars in economic damages each year due to windstorms, and these vulnerabilities are increasing.
- (3) Improved windstorm impact reduction measures have the potential to reduce these losses.
- (4) There is an appropriate role for the Federal government in mitigating windstorm impacts, and significant coordination and cooperation is required for any program to be effective.

Sec. 3. Definitions.

Defined terms used in the text.

Sec. 4. National Windstorm Impact Reduction Program.

(a) Establishment- Establishes the National Windstorm Impact Reduction Program.

(b) Objective- Achievement of major measurable reductions in losses of life and property from windstorms through a coordinated federal effort, in cooperation with other public and private entities, to improve understanding of windstorm impacts and develop and encourage implementation of mitigation measures to reduce those impacts.

(c) Interagency Working Group- Directs the Director of the Office of Science and Technology Policy to establish an Interagency Working Group on Windstorm Impact Reduction, consisting of representatives from NSF, NOAA, NIST, FEMA, and other federal agencies as appropriate. Also Directs the Director to designate an agency to chair the Working Group and to be responsible for managing the program. Specific agency roles and responsibilities shall be defined in the implementation plan in subsection (e).
General responsibilities-

- (1) NIST- support R&D to improve building codes, standards and practices for buildings, structures, and lifelines;
- (2) NSF- support research in engineering and the atmospheric sciences to improve the understanding of the behavior of windstorms and their impact on buildings, structures, and lifelines;
- (3) NOAA- support atmospheric sciences research to improve the understanding of the behavior of windstorms and their impact on buildings, structures, and lifelines; 4) FEMA-

support windstorm-related data collection and analysis, public outreach, and information dissemination.

(4) FEMA- support windstorm-related data collection and analysis, public outreach, and information dissemination.

(d) Program Components-

(1) Establishes three primary components for the Program: improved understanding of windstorms, windstorm impact assessment, and windstorm impact reduction. Requires the components to include activities such as data collection and analysis, outreach, tech transfer, and R&D. Requires that, to the extent practicable, research shall be peer-reviewed and the components shall be designed avoid duplication of other hazard reduction efforts.

(2) Understanding of windstorms- research to improve understanding of and data collection on the impact of severe winds on buildings, structures, and infrastructure.

(3) Windstorm impact assessment- (A) development of mechanisms for collecting and inventorying information on structural performance in windstorms and collection of information from sources including the design and construction industry, insurance companies, and building officials; (B) R&D to improve loss estimation and risk assessment systems; and (C) R&D to be improve simulation and computational modeling of windstorm impacts.

(4) Windstorm impact reduction- (A) development of cost-effective windstorm-resistant systems, structures, and materials for use in new construction and retrofitting; (B) development of improved outreach and implementation mechanisms to translate existing information and research findings into cost-effective practices for design and construction professionals, and state and local officials; (C) outreach to increase public awareness about windstorm hazard vulnerability.

(e) Implementation Plan- Requires the Interagency Working Group to develop a plan for achieving the objectives of the Program not later than 12 months after the date of enactment. The Implementation Plan shall include –

(1) an assessment of past and current public and private efforts to reduce windstorm impacts;

(2) a statement of strategic goals for each component area;

(3) a description of how the program will achieve its goals, including detailed responsibilities for each agency; and

(4) a description of plans for public and private cooperation and coordination.

(f) Biennial Report- The Interagency Working Group shall submit a biennial report to Congress providing an assessment of the status of the Program, including recommendations for changes.

Sec. 5. National Advisory Committee on Windstorm Impact Reduction.

(a) Establishment- Establishes a National Advisory Committee to review progress made under the Program, advise on improvements, and report to Congress on actions taken to limit vulnerability to windstorms. Requires that the Advisory Committee include between 11 and 15 members to be appointed by the Director, one of whom shall be

designated as chair. Requires that members include representatives of a broad cross-section of interests. Federal agencies may not be members of the Advisory Committee.

(b) Assessment - Requires the Advisory Committee to assess the effectiveness of the Program.

(c) Biennial Report- Requires the Advisory Committee to provide, on a biennial basis, a summary report of the assessment to Congress and the Interagency Working Group.

(d) Sunset Exemption- Exempts the Advisory Committee from Section 14 of the Federal Advisory Committee Act (sunset requirement).

Sec. 6. Savings Clause.

States that nothing in the Act supersedes any provision of the National Manufactured Housing Construction and Safety Standards Act of 1974.

Sec. 7. Authorization of Appropriations.

H.R. 3980 Authorized Funding Levels by Agency (\$ in millions)

	2005	2006	2007
FEMA	\$8	\$8.7	\$9.4
NSF	\$8	\$8.7	\$9.4
NIST	\$2	\$3	\$4
NOAA	\$2	\$2.1	\$2.2